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P28330EP

Claims

1. A power control circuitry for controlling the output power level (P_{out}) of a signal ($x(t)$) to be transmitted at the output port of a variable-gain power amplifier (105), said power control circuitry (101M+N) comprising
a current sense loop (101M) with an integrated comparator stage (112'') having a first input port supplied with a reference signal (V_{ref}) representing the nominal power level (P_{ref}) for the output power (P_{out}) and a second input port supplied with a signal from a current sensor (204) which is placed in the power supply line of a variable-gain power amplifier (105), wherein the output signal of said comparator stage (112'') is fed to the power control input port of the variable-gain power amplifier (105),
characterized by

- power sensing means (108) for detecting the power of a feedback signal (V_{PD}) representing the reflected wave of the signal ($x(t)$) to be transmitted, and
- a feedback loop (101N) for feeding said reference signal (V_{ref}) derived from said feedback signal (V_{PD}) and a reference ramp signal (V_{ramp}) to the first input port of the comparator stage (112'') in order to increase the radiated power (P_{out}) of said signal ($x(t)$) in case a transmit antenna (110) is mismatched to the variable-gain power amplifier (105).

2. A power control circuitry according to claim 1,
characterized by
signal processing means comprising

- a multiplier (301b) for multiplying a processed version ($K \cdot G_{OP} \cdot V_{PD}$) of the feedback signal (V_{PD}) by the reference ramp signal (V_{ramp}),
- a summation element (301a), used for adding the output signal ($V_{ramp} \cdot K \cdot G_{OP} \cdot V_{PD}$) of the multiplier (301b) to the reference ramp signal (V_{ramp}), thereby yielding said reference signal (V_{ref}).

3. A power control circuitry according to claim 1, characterized by digital signal processing means (201C) comprising a multiplication element (301b') for multiplying a gain factor ($\chi := 1 + K \cdot G_{OP} \cdot V_{PD}$) supplied by a gain factor control unit (301c) by the reference ramp signal (V_{ramp}), wherein K is a normalization factor (in V^{-1}) and G_{OP} denotes the gain factor of an operational amplifier (303) in said feedback loop (101N), thereby yielding said reference signal (V_{ref}).

4. A power control circuitry according to anyone of the claims 1 to 3, characterized by decoupling means (106) at the output port of the variable-gain power amplifier (105) for providing a feedback signal (V_{PD}).

5. A power control circuitry according to claim 4, characterized in that said decoupling means (106) is realized as a directional coupler (106') or a circulator (106'').

6. A method for stabilizing the power level (P_{out}) of a signal ($x(t)$) to be transmitted at the output port of a variable-gain power amplifier (105), said method being characterized by the following steps:

- detecting (S1) the voltage level (V_{PD}) of a feedback signal which represents the reflected wave of said signal ($x(t)$),
- calculating (S1A) a reference signal (V_{ref}) representing the nominal power level (P_{ref}) for the output power (P_{out}) of the RF output signal ($x(t)$) as a function of a reference ramp signal (V_{ramp}) and said feedback signal (V_{PD}),
- feeding (S2) the obtained reference signal (V_{ref}) to a first input port of a comparator stage (112'') in the feedback chain of the current sense loop (101M),
- feeding (S4) a signal representing the DC supply current (I_{PA}) of the variable-gain power amplifier (105) to a second input port of said comparator stage (112''),
- comparing (S5) the voltage level of the signal derived from said voltage drop (U_{RM}) with the voltage level of said reference signal (V_{ref}),

- feeding (S6) a signal being a function of the difference between the signal derived from said voltage drop (U_{RM}) and the calculated reference signal (V_{ref}) to a first input port of the power amplifier (105), and
- adjusting (S7) the current power level (P_{out}) by amplifying the difference between the output signal of said comparator stage (112'') and the signal ($x(t)$) to be transmitted before being amplified at a second input port of the variable-gain power amplifier (105).

7. A method according to claim 6,
characterized in that
the step (S1A) of calculating said reference signal (V_{ref}) comprises the following steps:
- multiplying (S1a') a processed version ($K \cdot G_{OP} \cdot V_{PD}$) of the feedback signal (V_{PD}) by the reference ramp signal (V_{ramp}) and
- adding (S1a'') the output signal ($V_{ramp} \cdot K \cdot G_{OP} \cdot V_{PD}$) of the multiplication step (S1a') to the reference ramp signal (V_{ramp}), thereby yielding said reference signal (V_{ref}).

8. A method according to claim 6,
characterized in that
the step (S1A) of calculating said reference signal (V_{ref}) comprises the step of multiplying (S1b) a gain factor ($\chi := 1 + K \cdot G_{OP} \cdot V_{PD}$), which is supplied by a gain factor control unit (301c), by the reference ramp signal (V_{ramp}), thereby yielding said reference signal (V_{ref}).

9. A wireless telecommunication device,
characterized by
a mobile RF transmitter (300a, 300b or 300c) comprising a power control circuitry (101M+N) according to anyone of the claims 1 to 5.